DRAMA 4 Q&A

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DRAMA 4.1 key features (1/3)

OSCAR:

- New disposal options: Circular delayed de-orbit; resonance based disposal
- (Custom) protected region crossing analysis
- Attitude simulation: Based on user provided attitude law

ARES:

- Attitude consideration for collision cross-section
- Low-thrust and drag-augmentation manoeuvre options

MIDAS:

- Attitude consideration

MASTER:

- SIM-overlay feature (user-defined population)
- Integrated into DRAMA GUI
- Fixed evaluation at reference epoch option

DRAMA 4.1 key features (2/3)

SARA:

- Tank bursting model
- New shape: Hollow hemisphere
- New material models: Glass and “ablative” materials
- New release trigger: Mass loss
- Improvements to custom shapes

CROC:

- Deprecated by “Coefficient Estimator” (CE)

CE:

- Computes cross-sections, SRP, aerodynamic coefficients, radar/optical areas

DRAMA 4.1 key features (3/3)

Trackability and brightness assessment:

- New workflow, leveraging PROOF, NEPTUNE and CE
- Computation of detections and resulting covariance
- Based on assumed default, or user-defined sensor network
- Using spacecraft geometry and materials
- Modelling of optical/radar and ground/space-based sensors
- Available modes:
  - Object/population trackability analysis
  - Brightness analysis
  - Ares catalogue uncertainty generation

Release dates

- DRAMA 4.0 beta (new GUI only): delayed indefinitely
- DRAMA 4.1 (new functionalities, updated standards): End of July 2025
- DRAMA 4.1.x patches/maintenance through end of 2025, 2026
- DRAMA 4.2 (?) MASTER 9 update late 2026 early 2027

Q's (1/2)

What will happen to the old MASTER/DRAMA?

- The legacy versions will continue to be maintained and supported with patches. Ongoing missions can continue to use these versions
- They will not receive new features, but remain available for download
- MASTER will be integrated into DRAMA going forward

What are the system requirements for DRAMA 4?

- CPU/RAM requirements remain similar to DRAMA 3
  - RAM requirements mainly driven by MASTER 8 (on Windows in particular). This will be addressed in upcoming MASTER 9 release (2026)
- Java 17+ needed for SARA-RISK
- Java 8 needed for CROC (optional, as CE is available as alternative)

Q's (2/2)

What about pyDRAMA?

- pyDRAMA will continue to be available within the DRAMA installation, and will continue to receive updates
- Wrappers for other tools (MASTER, PROOF, CE) will be made available as well
- Possible future distribution via SDUP (and maybe pypi) as wheels

Will DRAMA 4 aid the user in designing for compliance?

- DRAMA is designed to check for compliance of a given design only, the task of iterating a design remains with the user
- In the future, features to iterate designs might be added, until then pyDRAMA allows users to iterate designs quickly

Are probabilistic assessments (solar-cycle sampling, monte-carlo) supported:

- DRAMA 4.1 will not include these assessments at release, pyDRAMA will be needed, see: https://debris-forum.sdo.esoc.esa.int/
- In the future, workflows for probabilistic assessments will be integrated into the GUI

Example: Compliance analysis

Using compliance analysis mode for ESSB-ST-U-007 5.4.2.3

Output not verbose: mainly compliant/non-compliant output

HTML/PDFs can be generated to be added to Space Debris Mitigation Reports

Requirement: ESSB - OrbitInterference

The workflow issued the following messages:

- Compliant:
- Initial Orbit Altitude (491.39) below 375 km: False
- Disposal starts in LEO: True
- Natural decay 4.825 below 5 years: True
- Not crossing LEO protected region: False
- LEO interference time 4.825 less than 25 years: True
- Not crossing GEO protected region: True
- >1 cm cumulative collision risk 4.464e-05 < 1e-3: True

Example: Object trackability analysis

Based on S/C model and using default “USSSN” sensor network:

DRAMA propagates the orbit of defined mission phase time, simulates passes based on sensor network, spacecraft geometry and materials

	Radial (R)	Transv. (T)	Normal (N)
R	9.123e-11	1.052e-10	-8.021e-11
T	1.052e-10	1.847e-10	-7.745e-11
N	-8.021e-11	-7.745e-11	5.75e-10

Uncertainties in RTN:			
St. Dev.	0.093m	5.85m	0.024m